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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Klaus Grossmann

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26474

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EXAMINER

BROWN, COURTNEY A

ART UNIT

PAPER NUMBER

1616

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/508,837	Applicant(s) GROSSMANN ET AL.	
	Examiner COURTNEY BROWN	Art Unit 1616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-14 is/are pending in the application.
- 4a) Of the above claim(s) 13 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Acknowledgement of Receipt/Status of Claims

This Office Action is in response to the amendment filed April 22, 2009. Claims **2-14** are pending in the application. Claim **1** has been cancelled. Claim **2** has been amended. Claims **13 and 14** have been withdrawn as being directed to a non-elected invention. Claims **2-12** are being examined for patentability.

The rejection of claims **2-12** under 35 U.S.C. 103(a) as being unpatentable over Bounga. (WO 01/20020 A2) and Finn et al. (Bioorganic and Medicinal Chemistry Letters) in view of Arteca (Plant Growth Substances: Principle and Applications) is maintained.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bounga et al (WO 01/20020 A2) and Finn et al. (Bioorganic and Medicinal Chemistry Letters) in view of Arteca (Plant Growth Substances: Principle and Applications).

Applicant's Invention

Applicant claims a method for identifying a herbicidally active substance comprising: a.) bringing one or more enzymes selected from the group consisting of the enzymes tryptophan aminotransferase, indole-3-pyruvate decarboxylase, and indole -3-acetaldehyde oxidase or to a nucleic acid sequence which encodes one of the

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abovementioned enzymes into contact with one or more test substances to permit binding to the enzymes or the nucleic acid sequence, which encodes the said enzymes; b.) detecting if the test substance reduce or block transcription, translation or expression of at least one of the said enzymes; and c.) detecting if the test substance (which could be tryptophan, a tryptophan derivative, indole-3-pyruvate, an indole-3- pyruvate derivative, and indole-3- acetaldehyde or an indole-3-acetaldehyde derivative) reduces or blocks activity of at least one of the said enzymes or detecting if the test substance binds to one of the said enzymes(preferably tryptophan aminotransferase). Applicant also claims a method of identifying herbicidally active substance that comprises: a.) treating a test compound with a plant cell lysate which comprises at least one of the said enzymes or; b.) treating a test compound with one of the said enzymes which are either partially or fully purified and; c.) the enzymatic activity of at least one of the said enzymes is determined in comparison with one of the other said enzymes that has or has not been treated with the test compound and selecting the compounds that reduce or block the activity of at least one of the said enzymes.

***Determination of the scope and the content of the prior art
(MPEP 2141.01)***

Bounga et al. teach a method for screening and identification of compounds or compositions useful as herbicides, growth regulators or fungicides involving the addition of the compound or composition to be screened or identified to a culture or culture area of a yeast strain transformed with and expressing one or more plant cell

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cycle control genes or mutants (phytoyeast) as well as to a control yeast strain; and, determining the effect on the phenotype (growth and/or cell division and/or cell size/shape) of said phytoyeast compared to said control yeast. Bounaga et al. further teach a biological screening assay (high throughput system) comprising the use of said phytoyeast expressing plant cell cycle control proteins to identify novel compounds or compositions that affect yeast or phytoyeast phenotype. Bounaga et al. also teach methods for producing a pesticide, herbicide, plant growth regulator or fungicide, comprising the steps of (a) identifying a compound or composition as defined above or a derivative or homologue thereof, and, (b) mixing said compound, composition, derivative or homologue thereof with an acceptable carrier and the use of said compounds or compositions for inhibiting or stimulating plant growth and/or for increasing crop yield and/or for preventive or curative protection of the plant against fungal infection (abstract).

Finn et al. teach that enzymes involved specifically in tryptophan biosynthesis are potential herbicide targets. Specifically, Finn et al. teach that inhibitors of the final enzyme in the tryptophan biosynthesis pathway (tryptophan synthase) are herbicidal (see page 2297).

***Ascertainment of the difference between the prior art and the claims
(MPEP 2141.02)***

The difference between the invention of the instant application and that of Bounaga et al. and Finn et al. is that the instant invention requires the use of enzymes selected from the group consisting of tryptophan aminotransferase, indole-3-pyruvate

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decarboxylase, and indole-3-acetaldehyde oxidase in order to identify herbicidally active substances as opposed to the use of tryptophan synthase . For this reason, the teaching of Arteca is joined. Arteca teaches that tryptophan transaminase (i.e. tryptophan aminotransferase) and indolepyruvate decarboxylase (i.e. indole-3-pyruvate decarboxylase) are key enzymes in the pathway in which tryptophan is converted to indole acetic acid (IAA) (see pages 48 and 49). Arteca teaches that auxins such as indole acetic acid (IAA) are plant growth substances (see pages 46-47) and have many physiological effects in plant systems which include cellular elongation, phototropism, geotropism, apical dominance, root initiation and elongation, ethylene production, and fruit growth (see pages 53-57).

Finding of prima facie obviousness

Rationale and Motivation (MPEP 2142-2143)

It would have been obvious to one of ordinary skill in the art at the time of the instant invention to combine the teachings of the cited references to arrive at a method of identifying herbicidally active substances. It would be obvious to one of ordinary skill in the art to substitute tryptophan synthase in the method taught by Finn et al. with one of the enzymes taught by Arteca (tryptophan aminotransferase and indole-3-pyruvate decarboxylase) as potential herbicidal targets. One would be motivated to substitute tryptophan aminotransferase or indole-3-pyruvate decarboxylase for tryptophan synthase as a herbicidal target because, as taught by Arteca, tryptophan aminotransferase or indole-3-pyruvate decarboxylase are key enzymes in the pathway

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in which tryptophan is converted to indole acetic acid (IAA), an important plant growth substance . Further, it would be obvious to one of ordinary skill in the art to combine the teaching of Bounaga et al. and Arteca to arrive at a method of identifying herbicidally active substances because Bounaga et al. teach a method of identifying herbicidal active compounds comprising the addition of a test substance to a culture area of yeast strain expressing one or more plant cell cycle control genes. Arteca teaches that auxins such as indole acetic acid (IAA) are plant growth substances (see pages 46-47) and have many physiological effects in plant systems which include cellular elongation. One of ordinary skill in the art would have been motivated at the time of the instant invention to make this combination in order to receive the expected benefit of using the methods of identifying potential herbicides as taught by Bounaga et al. and Finn et al. using tryptophan aminotransferase and indole-3-pyruvate decarboxylase as herbicide targets due to the understanding of the role of indole acetic acid as a plant growth substance as well as the roles that tryptophan aminotransferase and indole-3-pyruvate decarboxylase play in the indole acetic acid biosynthetic pathway as taught by Arteca.

All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time of the invention.

Therefore, the claimed invention as a whole would have been prima facie obvious to one of ordinary skill in the art at the time the invention was made because every element of the invention has been fairly suggested by the cited reference.

Examiner's Response to Applicant's Remarks

Applicant's arguments, filed April 22, 2009 with respect to the rejection of Claim 1 is rejected under 35 U.S.C. 112, second paragraph have been considered but are moot in view of Applicant's Amendment.

Applicant's arguments filed on April 7, 2008 with respect to the rejection of examined claims have been fully considered but they are not persuasive.

With regard to Bounaga, Applicant argues that Bounaga does not describe or otherwise suggest any of the three targeted enzymes (tryptophan aminotransferase, indole-3-pyruvate decarboxylase and indole-3-acetaldehyde oxidase) of the instant claims and does not provide any suggestion of the possibility of targeting the claimed enzymes and/or compounds. The Examiner agrees with this argument. However, the teaching of Bounaga was joined to show that a method for screening and identifying compounds useful as herbicides, involving the addition of the compound to be screened or identified to a culture or culture area as well as the use of a biological screening assay (high throughput system) to identify novel herbicidal compounds was known at the time of the instant invention.

With regard to Finn, Applicant argues that Finn describes that herbicides may be designed for purposes of attacking the biosynthetic pathway for tryptophan. Applicant argues that Tryptophan, when compared with the claimed enzymes, is a compound that is found at an earlier position in the biopathway and is more appropriately considered to comprise a "starting" compound of the biopathway of the instantly targeted enzymes (See, e.g. Figure 3.3. on page 48 of the Arteca reference). Applicant concedes that Finn

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leads the skilled artisan to utilize the specific compounds described therein and effectively teaches away from the combination propounded in the Office Action.

Applicant also concedes that there is simply no underlying rationale or motivation for a skilled artisan to continue to search for other additional compounds that may interrupt the biopathway in a later stage. However, the Examiner disagrees because the biopathway from tryptophan leads to **indole acetic acid (IAA)** which is known to one of ordinary skill in the art, as taught by Arteca, to be an auxin. Auxins are plant growth substances (see pages 46-47 of Arteca) and have many physiological effects in plant systems which include cellular elongation. Therefore, auxins play an essential role in coordination of many growth and behavioral processes in the plant life cycle. The instantly claimed enzymes, tryptophan aminotransferase and indole-3-pyruvate decarboxylase are important role players in the biosynthetic pathway from tryptophan leading to indole acetic acid (see figure 3.3, page 48 of Arteca). Therefore, it would be obvious to one of ordinary skill in the art to inhibit one of the aforementioned enzymes for the purpose of stopping the synthesis of indole acetic acid (IAA) which would inevitably inhibit plant growth.

With regard to Arteca, Applicant argues that Arteca describes the pathway from tryptophan to indole-3-acetic acid. (See pages 48 and 49). Upon review of Figure 3.3, page 48, Applicant points to the fact that indole-3-acetic acid can be synthesized from tryptophan via two routes, as described by Arteca, "There are two major pathways in which tryptophan may be converted to IAA of which one or both may function in a given plant species." (Page 49, first paragraph). Applicant concludes that the instantly

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targeted enzymes do not affect the “right route” at all and concludes that Arteca teaches away from the instant claims as a skilled artisan would have no reasonable expectation of success. However, the Examiner disagrees because when reviewing Figure 3.3 and the **whole** paragraph on page 49, Arteca clearly teaches that:

“There are two major pathways in which tryptophan may be converted to IAA of which one or both may function in a given plant species. The first pathway is via the conversion of tryptophan to indole-3-pyruvic acid by the enzyme **tryptophan transaminase** it is then decarb-oxylated by **indolepyruvate decarboxylase** to indole-3-acetaldehyde (IAAld), which is subsequently converted to IAA via **indoleacetaldehyde dehydrogenase** The second pathway involves the decarboxylation of tryptophan to tryptamine by tryptophan decarboxylase, which is then converted to IAAld by amine oxidase and finally to IAA by IAAld dehydrogenase.”

Therefore, the instantly targeted enzymes; tryptophan aminotransferase (i.e. tryptophan transaminase), indole-3-pyruvate decarboxylase (i.e. indolepyruvate decarboxylase, and indole-3-acetaldehyde oxidase (i.e., indoleacetaldehyde dehydrogenase) **do affect** the “right route” in the synthesis of IAA.

Applicant has argued against the aforementioned references individually, However, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Obviousness can only be established by combining or modifying the

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teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, one of ordinary skill in the art would have been motivated at the time of the instant invention to make this combination in order to receive the expected benefit of using the methods of identifying potential herbicides as taught by Bounga et al. and Finn et al. using tryptophan aminotransferase, indole-3-pyruvate decarboxylase, as well as indole-3-acetaldehyde oxidase as herbicide targets due to the understanding of the role of indole acetic acid as a plant growth substance as well as the roles that tryptophan aminotransferase, indole-3-pyruvate decarboxylase, and indole-3-acetaldehyde oxidase play in the indole acetic acid (IAA) biosynthetic pathway as taught by Arteca.

Accordingly, in view of the cited references and that knowledge generally available to the ordinarily skilled artisan, it is apparent that such individual would have been motivated to combine the teachings of the respective references in the manner of Applicant to arrive at the claimed invention.

The claims remain rejected.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR Only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Courtney Brown, whose telephone number is 571-270-3284. The examiner can normally be reached on Monday-Friday from 8 am to 4:30 pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's Supervisor, Johann Richter can be reached on 571-272-0646. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Courtney A. Brown
Patent Examiner
Technology Center 1600
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/Mina Haghighatian/
Primary Examiner, Art Unit 1616